

According to the SEGHS report, the task force's proposed formula allows for future adjustment and is also flexible enough to be used internationally, though environmental standards for lead vary from country to country. "Still," said Davies, "our result is a starting point, not an end point. We need to test these guidelines in real-world situations. New information will change some of the current concepts. That's the way it should be."

To MTBE or Not to MTBE

Current efforts to protect people from the dangers of carbon monoxide may be doing more harm than good. In response to findings that levels of carbon monoxide were unusually high throughout U.S. cities, the EPA mandated in 1992 that every state add the oxygenates ethanol and methyl tertiary butyl ether (MTBE) to gasoline to reduce carbon monoxide emissions in problem areas. The additives are used during the winter months, when carbon monoxide emissions are highest.

A year after the onset of the oxygenated fuels program, the results in some states haven't been what the EPA expected. North Carolina is one state where the program has not significantly reduced carbon monoxide emissions.

In addition, studies have shown that MTBE may be a carcinogen. The toxicity of MTBE has become a major concern because inhalation exposure to the compound is widespread. There is also potential for contamination of drinking water from gasoline spills and leakage from underground storage tanks.

Two studies have found that MTBE causes tumors in mice and rats. In an inhalation study, conducted by H.D. Burleigh-Flayer and colleagues at the Bushy Run Research Center, Union Carbide Chemicals and Plastics Company, Inc., in 1992 exposed groups of 50 CD-1 male and female mice to MTBE at concentrations of 400, 3,000, and 8,000 parts per million (ppm) for 6 hours a day, 5 days a week, for 18 months. The MTBE caused an increase of liver tumors at the highest dose. There was a statistically significant increase in adenomas in female mice, and a statistically significant increase in carcinomas in male mice. However, the study had to be terminated early (at 18 months rather than 24 months as planned) due to high-dose toxic effects.

Therefore, whether MTBE would have affected mice in the lower-dose groups if the study had continued is not known.

In an inhalation study conducted by J.S. Chun and co-workers, also of Bushy Run, in 1992, groups of 50 F344 rats were exposed to MTBE at the same concentrations as in previous study. The low-dose group was exposed for 24 months, the mid-dose group for 97 weeks, and the high-dose group for only 82 weeks, due to toxicity leading to early mortality. In mid- and high-dose groups of male rats, a statistically significant increase in interstitial cell testicular tumors occurred that was clearly dose related. The number of tumors in control groups were high, but an increased number of tumors in the treated groups was apparent. Male rats in mid- and high-dose groups also developed significant increases in kidney tumors.

Preliminary results from an ongoing study being conducted by Cesare Maltoni and colleagues at the Collegium Ramazzini in Italy also contribute to the weight of information on the toxicity of MTBE. This study subjected Sprague Dawley rats to MTBE by olive oil gavage for the lifetime of the rats. Increases in several types of tumors occurred at 250 milligrams per kilogram (mg/kg) and 1000 mg/kg MTBE, including malignant sarcomas, testicular Leydig cell tumors, hemolymphoreticular tumors, and combined lymphomas and leukemias. Not all dose groups have been reported. Although these results are preliminary, they are notable because tumors are being seen at much lower concentrations of MTBE than in the other two studies.

The EPA conducted a risk assessment study last year using the results of the Burleigh-Flayer and Chun studies, and tentatively determined that there was no risk to humans. The EPA concluded that there was not enough evidence to assess the risk of

MTBE because there are no pertinent human data and stated that the controversy around the animal studies warranted further evaluation. The EPA cited "major uncertainties" in the database of the rodent research, pertaining to high-dose toxicity, possible species specificity, and high spontaneous background tumor incidence.

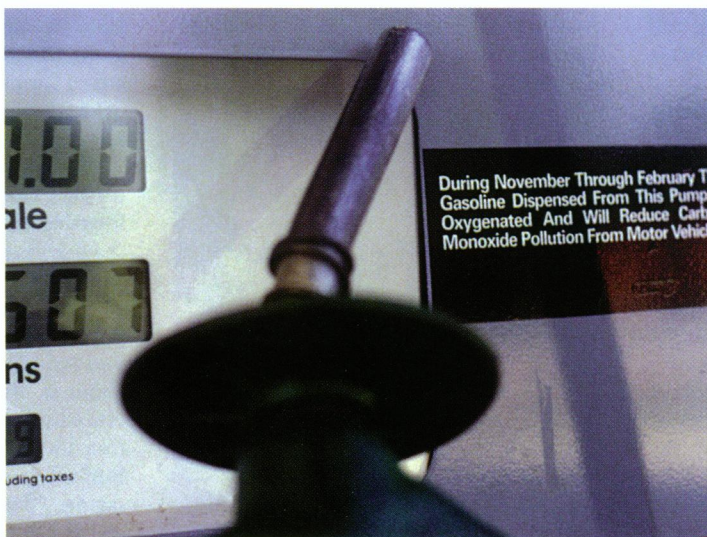
The EPA did consider Maltoni's results, but decided they were too preliminary at the time to affect the risk assessment. No final classification of MTBE was made. MTBE was assigned a tentative "C" classification, a possible human carcinogen, based on limited evidence.

Although Maltoni's results have yet to be released, the existing evidence that MTBE may be a human carcinogen has led North Carolina officials to question its use. A report on the public health impact of the oxygenated fuels program was written by the Environmental Epidemiology Section of the North Carolina Department of Environment, Health and Natural Resources. The authors of the report concluded that "the oxygenated fuels program utilizing MTBE does not provide any public health benefit in North Carolina at this time and may indeed be posing an increased health risk to the public."

The scientific advisory board to the DEHNR in the Division of Environmental Management recently evaluated the evidence. The scientific advisory board conducted its own risk assessment and concluded that, according to the National Toxicology Program classification of carcinogenic activity, there is "some evidence" for carcinogenicity of MTBE. The board added that if the details of the Maltoni study are released and reviewed and the preliminary results are confirmed, the data may support "clear evidence of carcinogenicity."

The board also took into account that there are other carcinogens already in gasoline, such as benzene (a class "A," or known carcinogen). An argument in favor of MTBE use is that it reduces the amount of benzene in gasoline. However, as the board acknowledged, MTBE could act synergistically with benzene, producing adverse health effects. Because there is no evidence on the interactions between benzene and MTBE, the board could not determine whether the addition of MTBE alters the chemical composition of gasoline for the better or worse.

The board concluded that the state should consider requesting that the EPA remove MTBE from gasoline because of the uncertainties surrounding it.



Adding to the problem? New information fuels the debate over oxygenated gasoline.

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